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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LAMARRE, GUY J

ART UNIT PAPER NUMBER

2133

DATE MAILED: 09/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/931,996

Applicant(s)

HOSHIZAWA ET AL.

Examiner

Guy J. Lamarre, P.E.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

FINAL OFFICE ACTION

1. This office action is in response to Applicants' Amendment of 17 May 2004.
- 1.1 Claims 1-16 are cancelled, **Claims 17-33** are added. **Claims 17-33** remain pending.
- 1.2 The **objections** and rejections of record are withdrawn in response to Applicants' amendment.

Response to Arguments

2. Applicants' arguments of 17 May 2004 have been fully considered, and are persuasive only to the extent that the amended step of the plural (greater than, or equal to two) interleaving rules is not specifically described in detail by the art of record. Said step is supported by **Curie et al.** (US Patent No. 4,394,642), as follows.

Claim Rejections - 35 USC § 103

- 3.1 **Claim(s) 17-33** is/are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art 'Specifications' (hereinafter Specs) in view of **Sollish et al.** (U.S. Patent No. 6,311,305; hereinafter Sollish) in further view of **Curie et al.** (US Patent No. 4,394,642).

As per claims 17, 28-29, 33

Specs substantially teaches of a method of recording data on a medium that comprises of rearranging an order of words (interleaving) forming a data train constituting an error correcting code for recording the data on the recording medium, see lines 3-20 of page 4. Specs further teaches of recording the data on the medium in the order that they have been rearranged (interleaved), see lines 9-25 of page 4 and modulation means via modulating the data train, and recording the data train, see lines 3-20 of page 4 and 25-29 of page 4.

Specs does not teach of rearranging (interleaving) each of the data trains under a different rule. Nonetheless, Specs does teach of interleaving/rearranging the entire ECC block with a single rearrangement rule, see lines 6-10 of page 8.

Sollish, in an analogous art, teaches of using different interleaving rules for different data groups/data trains, see lines 35-60 of column 4 and specifically Figure 6 for the mapping/interleaving scheme based on the group number (i.e. data train ID number). While Sollish does not explicitly teach of interleaving each row separately, Sollish does teach of interleaving each data group according to different rules (based on the group number said data belongs to). With the applicant's ID field of each data unit (as seen in Figure 4), it is clear to one of ordinary skill in the art that the data group number is similar to the ID field.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Specs to include the interleaving scheme of Sollish so as to be able spread out the physical locations of the sequential data over the media so as to not let errors grossly impact any one segment of data, see Sollish lines 55-60 of column 4. This modification would have been obvious because one of ordinary skill in the art would have been motivated by the suggestion provided by Sollish that interleaving is chosen to sufficiently insure that reasonable levels of digital storage medium imperfection damage will cause contamination of only a few constituent symbols of an ECC codeword, see lines 60-65 of column 4.

Not specifically described in detail in Admitted prior art/Sollish is the step of the plural (greater than, or equal to two) interleaving rules.

However, Curie et al. discloses an equivalent data communications system (Figs. 1-8) comprising: transmitting/receiving/antenna/channel means, EDC/ECC means, address generation means, data assembling/disassembling/buffering means, interleaving/deinterleaving/spreading/dispreading means along with associated address generation/controlling means, data buffering/reading/writing means therefor in Fig. 1 and described in col. 1 line 9 et seq., wherein is implemented interleaving/deinterleaving/spreading/dispreading/re-arranging an order of bytes of first data

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columns according to two or more re-arranging rules where the first data columns are arranged in plurality of rows.

Curie et al. discloses the claimed interleaving/deinterleaving means comprising: input storing/address generating means (e.g., Figs. 2-3, 8 and related description in col. 1 line 65 et seq.), control means for data transfer adequate for permutation wherein data stored in matrix form is reordered via interchanging rows and columns or via interchanging combinations of rows and columns in Figs. 2, 4-7. Fig. 8 implements such interleaving/deinterleaving/re-arranging means in hardware comprising control circuitry, storing means (e.g., via look-up table in col. 5 line 11) along with clocking and address generation means (e.g., via programmable ROM look-up table in col. 5 line 9), wherein data is partitioned into arrays or N and M pieces in col. 5 line 21 et seq.

Curie et al. further discloses in detail the claimed interleaving/deinterleaving/re-arranging means, e.g., in col. 3 line 45, wherein dual orthogonal permutation or rotation of rows/columns and bits at col. 6 line 13 et seq., results in same permutation functionality as the claimed invention.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the procedure in **Admitted prior art/Sollish** by including plural row/column interleaving schemes as taught by **Curie**, because such modification would provide the procedure disclosed in **Admitted prior art/Sollish** with a technique whereby “*burst error correction is optimized.*” {See **Curie**, col. 3 line 45, col. 6 line 13 et seq.}

As per claim 18, 26-27, 31-32,

Specs further teaches of using a cross Reed Solomon code or PI/PO coding as the error correcting code, see lines 23-24 of page 2.

As per claim 19,

Specs further teaches of rearranging the order of the words except for the identification information, see lines 6-15 of page 3.

As per claim 20,

Sollish further teaches of using a plurality of rules to rearrange the words, see Figure 6 where each rule is dependent upon the number of the data group that the data is in.

As per claim 21,

Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to rearrange the words according to an M-series (pseudo random number series). The limitation of the claim, as they are interpreted, simply selects a pseudo random number and places the current bit/byte/word of data into that position. As is known in the art, the idea behind interleaving is to basically separate contiguous pieces of data so that burst errors can be overcome. Also known in the art is that interleavers and their corresponding de-interleavers both know of the reordering/rearrangement of the data in order to recreate the data in the correct order. Therefore it would have been obvious to one of ordinary skill in the art that some type of random number sequence (i.e. the order in which the pieces/bits/bytes/words of data is written) would have been used in an interleaver to rearrange the words.

As per claim 22,

Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an arithmetic progression. From Specs, see page 31 lines 16-23, it is clear that the use of an arithmetic progression merely interleaves data by placing every nth piece of data, i.e. with $n=3$ every 3rd piece of data would be placed 0, 3, 6, 9, ... 177, 180, 1, 4, 7, ..., 178, 181, 2, 5, 8, ..., 176, 179. On a smaller scale with only 11 pieces of data, 0-10, using $n=3$ again yields: 0, 3, 6, 9, 1, 4, 7, 10, 2, 5, 8. What is clearly visible to one of ordinary skill in the art is that the arithmetic progression defines the distance or pieces of data between any two

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contiguous pieces of data. For example, in the smaller scale with 11 numbers, it is clear that 0 and 1 are four spaces away as are 1 and 2. Therefore it is clear that the arithmetic progression is equivalent to an interleave scheme that separates contiguous data by a specified amount of time/spaces. This is well known in the art as setting an interleave ratio or factor, where a ratio or factor such as 4:1 is used to denote that every piece of contiguous data is 4 away.

As per claim 23,

Further it would have been obvious to one of ordinary skill in the art at the time the invention was made to rearrange data words that has been combined with a plurality of data words as a group. One skilled in the art would know that many time sensitive applications, such as network communication and data access time, rely heavily on the speed at which data that has been received/read can be de-interleaved and made useful. It would have been obvious to one skilled in the art to, with the desire to speed up both interleaving and de-interleaving process, to group plural words together. By grouping plural bytes/bits/words together, one reduces the amount of interleaving/de-interleaving that is required. One of ordinary skill in the art would obviously want to save time while maintaining the benefits of interleaving whenever the cases of the time sensitive applications of above arise. Therefore it would have been obvious to reduce the time take to interleave/de-interleave by grouping pieces/bits/bytes/words of data together.

As per claims 24-25, 29-30,

Further, once a method, such as the one in claims 17-27, is known/determined, it would have been obvious to one of ordinary skill in the art to implement the method in hardware devices such as circuits and signal processors to add/perform error correction, (de)modulate data, and to (de)interleave the recorded/reproduced data. Further, it would have been obvious to use a pickup for recording data to a data medium because a pickup is commonly used and well known in the art to be used in the recording of data.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

4.1 Any response to this action should be mailed to:

Commissioner of Patents and Trademarks, Washington, D.C. 20231

or faxed to: (703) 872-9306 for all formal communications.

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Fourth Floor (Receptionist).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Guy J. Lamarre, P.E., whose telephone number is (703) 305-0755. The examiner can normally be reached on Monday to Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert De Cady, can be reached at (703) 305-9595.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 305-3900.

Information regarding the status of an application may also be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Guy J. Lamarre, P.E
Primary Examiner
9/27/04
